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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

VU, QUANG D

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 08/29/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/917,945

Applicant(s)

HORIE, YOSHITAKA

Examiner

Quang D Vu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

Election/Restrictions

Applicant's election without traverse of the invention of group I, claims 1-11 in Paper No. 5 is acknowledged.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 8-10 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 recites the limitation "...divided into first and second groups." The scope of the claim is vague because the specification does not clearly define how the upper conductor is divided into first and second groups.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-3 and 6-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 4,005,454 to Froloff et al.

Regarding claim 1, Froloff et al. teach mounting a semiconductor chip on a lower conductor, with first solder material (9) applied between the chip and the lower conductor and positioning an upper conductor on the chip, with second solder material (10) applied between the chip and the upper conductor (see figure 1; column 3, line 43-column 4, line 30).

Froloff et al. do not explicitly teach heating up the first and the second solder materials beyond melting points of the respective materials; and solidifying the first and the second solder materials; wherein the first solder material is caused to solidify earlier than the second solder material. Froloff et al. teach solder materials that each have different melting points (Sn and Pb). There is nothing in the teaching of Froloff et al. to preclude using one of the materials for the first solder and the other for the second solder. Therefore, if one having ordinary skill in the art at had made this obvious design choice, the first solder material would have solidified before the second solder material.

Regarding claim 2, Froloff et al. teach a method, wherein the melting point of the first solder material is higher than the melting point of the second solder material.

Regarding claim 3, Froloff et al. do not explicitly teach the heating of the first solder material is terminated earlier than the heating of the second solder material. Froloff et al. teach the first solder material has melting point higher than the second solder material. It would have been within the ordinary skill in the art to select the order of terminating heat of the first or second solder material.

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Regarding claim 6, Froloff et al. teach a conductive frame, which includes the lower and the upper conductors (see figure 1).

Regarding claim 7, Froloff et al. teach the lower conductor comprises a die pad portion and lower lead portions extending from the die pad portion, the semiconductor chip being mounted on the die pad portion (see figure 1).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Froloff et al. as applied to claim 1 above, and further in view of US Patent No. 4,920,574 to Yamamoto et al.

Regarding claim 4, Froloff et al. do not teach the heating of the first and the second solder material is performed by contacting the lower and the upper conductors with first and second heaters, respectively. However, Yamamoto et al. teach the heating of the solder material with the heaters (see figures 13 and 15; column 9, lines 60-65; column 10, line 47 – column 11, line 1). Therefore, it would have been within the ordinary skill in the art at the time the invention was made to incorporate the teaching of Yamamoto et al. into the method taught by Froloff et al. as a matter of design choice, since the heaters are conventional electric heater for melting the solder material.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Froloff et al. as applied to claim 1 above, and further in view of Admitted Prior Art.

Regarding claim 5, Froloff et al. teach a semiconductor chip includes a flat lower electrode and an upper electrode, the lower electrode being connected to the lower conductor and the upper electrode being connected to the upper conductor. Froloff et al. do not teach a

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protruding upper electrode. However, Admitted Prior Art teaches the semiconductor chip includes a protruding upper electrode (see figures 18-19). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Admitted Prior Art into the method taught by Froloff et al. for better contact from the upper electrode to the chip.

7. Claims 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Froloff et al. as applied to claims 1, 6, 7 above, and further in view of US Patent No. 6,307,755 to Williams et al.

Regarding claim 8, Froloff et al. do not teach the upper conductor comprises upper lead portions divided into first and second groups. However, Williams et al. teach the upper conductor comprises upper lead portions divided into first and second groups (see figures 20E and 23A). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Williams et al. into the method taught by Froloff et al., since it is desirable for optional connections with the other devices.

Regarding claim 9, Froloff et al. do not teach the step of removing at least one of the lower and the upper lead portions from the frame. However, William et al. teach the step of removing at least one of the lower and the upper lead portions from the frame (see figures 18F-G). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of William et al. into the method taught by Froloff et al., since the portion of the lead frame must be cut in the final step for separating the lead finger from each other.

Regarding claim 10, Froloff et al. do not teach the frame comprises first and second common bars parallel to each other, the upper lead portions in the first group extending from the first common bar toward the second common bar, the upper lead portions in the second group extending from the second common bar toward the first common bar. However, Williams et al. teach the frame comprises first and second common bars parallel to each other, the upper lead portions in the first group extending from the first common bar toward the second common bar, the upper lead portions in the second group extending from the second common bar toward the first common bar (see figures 16D-F; 20A-E and 24C). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teaching of Williams et al. into the method taught by Froloff et al., since it is desirable for reducing or eliminating the risk of a short to the die edge, the termination, or the equipotential ring (column 19, lines 41-51).

Regarding claim 11, neither Williams et al. nor Froloff et al. teach the step of rotating the upper conductor about an axis relative to the lower conductor, so that the upper conductor comes into facing relation to the lower conductor. It would have been obvious to one having ordinary skill in the art at the time the invention was made to rotate the upper conductor facing to the lower conductor for controlling the balance on the lead frame bar during die trimming (column 16, lines 15-25).

Conclusion

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quang D Vu whose telephone number is 703-305-3826. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

QVU

August 26, 2002

QVU

Tom Thomas

TOM THOMAS
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